



SEQUENCE LISTING

<110> GUERIN-MARCHAND, CLAUDINE
DRUILHE, PIERRE

<120> PEPTIDE SEQUENCES SPECIFIC FOR THE HEPATIC STAGES OF
P. FALCIPARUM BEARING EPITOPES CAPABLE OF STIMULATING
THE T LYMPHOCYTES

<130> 010830-118

<140> 09/900,963

<141> 2001-07-10

<150> 08/098,327

<151> 1993-11-24

<150> PCT/FR92/00104

<151> 1992-02-05

<150> FR 91 01286

<151> 1991-02-05

<160> 47

<170> PatentIn Ver. 3.3

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<223> Description of Artificial Sequence: Synthetic Formula
Sequence

<220>

<221> MOD_RES

<222> (8)

<223> Glu or Gly

<400> 1

Leu Ala Lys Glu Lys Leu Gln Xaa Gln Gln Ser Asp Leu Glu Gln Glu
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Arg

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<220>
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 <222> (6)
 <223> Glu or Asp

<220>
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<220>
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<400> 2
 Xaa Asp Leu Glu Gln Xaa Arg Xaa Ala Lys Glu Lys Leu Gln Xaa Gln
 1 5 10 15

Gln

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<220>
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<220>
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 <222> (7)
 <223> Glu or Asp

<220>
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 <222> (9)
 <223> Arg or Leu

<220>
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 <223> Glu or Gly

<400> 3
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 1 5 10 15

Gln

<210> 4
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<220>
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<220>
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 <222> (10)
 <223> Arg or Leu

<220>
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 <222> (17)
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<400> 4
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 1 5 10 15

Xaa

<210> 5
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<220>
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 <222> (11)
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<400> 5
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Gln

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<220>
 <221> MOD_RES
 <222> (10)
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<220>
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 1 5 10 15

Leu

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 <223> Glu or Asp

<220>
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 <222> (13)
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<400> 7
 Leu Gln Xaa Gln Gln Xaa Asp Leu Glu Gln Xaa Arg Xaa Ala Lys Glu
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Lys

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<220>
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 Lys Leu Gln Xaa Gln Gln Xaa Asp Leu Glu Gln Xaa Arg Xaa Ala Lys
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Glu

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 1 5 10 15

Lys

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<223> Description of Artificial Sequence: Synthetic Formula
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<223> Glu or Gly

<220>

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<223> Ser or Arg

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<223> Glu or Asp

<220>

<221> MOD_RES

<222> (16)

<223> Arg or Leu

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<223> Glu or Gly

<220>

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<223> Ser or Arg

<220>

<221> MOD_RES

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<223> Glu or Asp

<220>
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 <222> (17)
 <223> Arg or Leu

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Xaa

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 <223> Ser or Arg

<220>
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 <222> (16)
 <223> Glu or Asp

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 1 5 10 15

Arg

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<220>
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Xaa

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<220>
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Xaa Arg Xaa Ala Lys Glu Lys Leu Gln Xaa Gln Gln Xaa Asp Leu Glu
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Gln

<210> 15

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<220>

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<222> (11)

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Gln Xaa Arg Xaa Ala Lys Glu Lys Leu Gln Xaa Gln Gln Xaa Asp Leu
 1 5 10 15

Glu

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 <222> (15)
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<400> 16
 Glu Gln Xaa Arg Xaa Ala Lys Glu Lys Leu Gln Xaa Gln Gln Xaa Asp
 1 5 10 15

Leu

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<220>
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<220>
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<220>
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 1 5 10 15

Asp

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<220>
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 <222> (14)
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 1 5 10 15

Xaa

<210> 19
 <211> 107
 <212> PRT
 <213> Plasmodium falciparum

<400> 19
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 1 5 10 15

Asp Ile Leu Ala Glu Asp Leu Tyr Gly Arg Leu Glu Ile Pro Ala Ile
 20 25 30

Glu Leu Pro Ser Glu Asn Glu Arg Gly Tyr Tyr Ile Pro His Gln Ser
 35 40 45

Ser Leu Pro Gln Asp Asn Arg Gly Asn Ser Arg Asp Ser Lys Glu Ile
 50 55 60

Ser Ile Ile Glu Lys Thr Asn Arg Glu Ser Ile Thr Thr Asn Val Glu
 65 70 75 80

Gly Arg Arg Asp Ile His Lys Gly His Leu Glu Glu Lys Lys Asp Gly
 85 90 95

Ser Ile Lys Pro Glu Gln Lys Glu Asp Lys Ser
 100 105

<210> 20

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<212> PRT

<213> Plasmodium falciparum

<400> 20

Leu Gln Glu Gln Gln Arg Asp Leu Glu Gln Arg Lys Ala Asp Thr Lys
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Lys Asn Leu Glu Arg Lys Lys Glu His Gly Asp Ile Leu Ala Glu Asp
 20 25 30

Leu Tyr Gly Arg Leu Glu Ile Pro Ala Ile Glu Leu Pro Ser Glu Asn
 35 40 45

Glu Arg Gly Tyr Tyr Ile Pro His Gln Ser Ser Leu Pro Gln Asp Asn
 50 55 60

Arg Gly Asn Ser Arg Asp Ser Lys Glu Ile Ser Ile Ile Glu Lys Thr
 65 70 75 80

Asn Arg Glu Ser Ile Thr Thr Asn Val Glu Gly Arg Arg Asp Ile His
 85 90 95

Lys Gly His Leu Glu Glu Lys Lys Asp Gly Ser Ile Lys Pro Glu Gln
 100 105 110

Lys Glu Asp Lys Ser
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<210> 21

<211> 27

<212> PRT

<213> Plasmodium falciparum

<400> 21

Asp Thr Lys Lys Asn Leu Glu Arg Lys Lys Glu His Gly Asp Ile Leu
 1 5 10 15

Ala Glu Asp Leu Tyr Gly Arg Leu Glu Ile Pro
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<210> 22

<211> 24

<212> PRT

<213> Plasmodium falciparum

<400> 22

Glu Arg Arg Ala Lys Glu Lys Leu Gln Glu Gln Gln Arg Asp Leu Glu
 1 5 10 15

Gln Arg Lys Ala Asp Thr Lys Lys
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<210> 23

<211> 31

<212> PRT

<213> Plasmodium falciparum

<400> 23

Asn Ser Arg Asp Ser Lys Glu Ile Ser Ile Ile Glu Lys Thr Asn Arg
 1 5 10 15

Glu Ser Ile Thr Thr Asn Val Glu Gly Arg Arg Asp Ile His Lys
 20 25 30

<210> 24

<211> 151

<212> PRT

<213> Plasmodium falciparum

<400> 24

Arg Asp Glu Leu Phe Asn Glu Leu Leu Asn Ser Val Asp Val Asn Gly
 1 5 10 15

Glu Val Lys Glu Asn Ile Leu Glu Glu Ser Gln Val Asn Glu Asp Ile
 20 25 30

Phe Asn Ser Leu Val Lys Ser Val Gln Gln Glu Gln Gln His Asn Val
 35 40 45

Glu Glu Lys Val Glu Glu Ser Val Glu Glu Asn Asp Glu Glu Ser Val
 50 55 60

Glu Glu Asn Val Glu Glu Asn Val Glu Glu Asn Asp Asp Gly Ser Val
 65 70 75 80

Ala Ser Ser Val Glu Glu Ser Ile Ala Ser Ser Val Asp Glu Ser Ile
 85 90 95

Asp Ser Ser Ile Glu Glu Asn Val Ala Pro Thr Val Glu Glu Ile Val
 100 105 110

Ala Pro Thr Val Glu Glu Ile Val Ala Pro Ser Val Val Glu Lys Cys
 115 120 125

Ala Pro Ser Val Glu Glu Ser Val Ala Pro Ser Val Glu Glu Ser Val
 130 135 140

Ala Glu Met Leu Lys Glu Arg
 145 150

<210> 25

<211> 47

<212> PRT

<213> Plasmodium falciparum

<400> 25

Arg Asp Glu Leu Phe Asn Glu Leu Leu Asn Ser Val Asp Val Asn Gly
 1 5 10 15

Glu Val Lys Glu Asn Ile Leu Glu Glu Ser Gln Val Asn Asp Asp Ile
 20 25 30

Phe Asn Ser Leu Val Lys Ser Val Gln Gln Glu Gln Gln His Asn
 35 40 45

<210> 26

<211> 26

<212> PRT

<213> Plasmodium falciparum

<400> 26

Asp Glu Leu Phe Asn Glu Leu Leu Asn Ser Val Asp Val Asn Gly Glu
 1 5 10 15

Val Lys Glu Asn Ile Leu Glu Glu Ser Gln
 20 25

<210> 27

<211> 27

<212> PRT

<213> Plasmodium falciparum

<400> 27

Leu Glu Glu Ser Gln Val Asn Asp Asp Ile Phe Ser Asn Ser Leu Val
 1 5 10 15

Lys Ser Val Gln Gln Glu Gln Gln His Asn Val
 20 25

<210> 28

<211> 27

<212> PRT

<213> Plasmodium falciparum

<400> 28

Val Glu Lys Cys Ala Pro Ser Val Glu Glu Ser Val Ala Pro Ser Val
 1 5 10 15

Glu Glu Ser Val Ala Glu Met Leu Lys Glu Arg
 20 25

<210> 29
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17

<210> 30
 <211> 15
 <212> DNA
 <213> Artificial Sequence

<220>
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15

<210> 31
 <211> 316
 <212> PRT
 <213> Plasmodium falciparum

<400> 31
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 Gln Ser Asp Leu Glu Gln Asp Arg Leu Ala Lys Glu Lys Leu Gln Glu
 20 25 30
 Gln Gln Ser Asp Leu Glu Gln Glu Arg Leu Ala Lys Glu Lys Leu Gln
 35 40 45
 Glu Gln Gln Ser Asp Leu Glu Gln Glu Arg Arg Ala Lys Glu Lys Leu
 50 55 60
 Gln Glu Gln Gln Ser Asp Leu Glu Gln Glu Arg Arg Ala Lys Glu Lys
 65 70 75 80
 Leu Gln Glu Gln Gln Ser Asp Leu Glu Gln Asp Arg Leu Ala Lys Glu
 85 90 95
 Lys Leu Gln Glu Gln Gln Ser Asp Leu Glu Gln Glu Arg Arg Ala Lys
 100 105 110
 Glu Lys Leu Gln Glu Gln Gln Ser Asp Leu Glu Gln Glu Arg Arg Ala
 115 120 125
 Lys Glu Lys Leu Gln Glu Gln Gln Ser Asp Leu Glu Gln Glu Arg Leu
 130 135 140
 Ala Lys Glu Lys Leu Gln Glu Gln Gln Ser Asp Leu Glu Gln Glu Arg
 145 150 155 160

Arg Ala Lys Glu Lys Leu Gln Glu Gln Gln Ser Asp Leu Glu Gln Glu
 165 170 175
 Arg Arg Ala Lys Glu Lys Leu Gln Glu Gln Gln Ser Asp Leu Glu Gln
 180 185 190
 Glu Arg Arg Ala Lys Glu Lys Leu Gln Glu Gln Gln Arg Asp Leu Glu
 195 200 205
 Gln Arg Lys Ala Asp Thr Lys Lys Asn Leu Glu Arg Lys Lys Glu His
 210 215 220
 Gly Asp Ile Leu Ala Glu Asp Leu Tyr Gly Arg Leu Glu Ile Pro Ala
 225 230 235 240
 Ile Glu Leu Pro Ser Glu Asn Glu Arg Gly Tyr Tyr Ile Pro His Gln
 245 250 255
 Ser Ser Leu Pro Gln Asp Asn Arg Gly Asn Ser Arg Asp Ser Lys Glu
 260 265 270
 Ile Ser Ile Ile Glu Lys Thr Asn Arg Glu Ser Ile Thr Thr Asn Val
 275 280 285
 Glu Gly Arg Arg Asp Ile His Lys Gly His Leu Glu Glu Lys Lys Asp
 290 295 300
 Gly Ser Ile Lys Pro Glu Gln Lys Glu Asp Lys Ser
 305 310 315

<210> 32

<211> 950

<212> DNA

<213> Plasmodium falciparum

<400> 32

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 agagacttgc taaagaaaag ttgcaagaac aacaaagcga tctagaacaa gagagacgtg 180
 ctaaagaaaa gttgcaagaa caacaaagcg atttagaaca agagagacgt gctaaagaaa 240
 agttgcaaga acaacaaagc gatttagaac aagatagact tgctaaagaa aagttacaag 300
 agcagcaaag cgatttagaa caagagagac gtgctaaaga aaagttgcaa gaacaacaaa 360
 gcgatttaga acaagagaga cgtgctaaag aaaagttgca agaacaacaa agcgatttag 420
 aacaagagag acttgctaaa gaaaagttgc aagaacaaca aagcgattta gaacaagaga 480
 gacgtgctaa agaaaagttg caagaacaac aaagcgattt agaacaagag agacgtgcta 540
 aagaaaagtt gcaagaacaa caaagcgatt tagaacaaga gagacgtgct aaagaaaagt 600
 tgcaagagca gcaaagagat ttagaacaaa ggaaggctga tacgaaaaaa aatttagaaa 660
 gaaaaaagga acatggagat atattagcag aggatttata tggtcgttta gaaataccag 720
 ctatagaact tccatcagaa aatgaacgtg gatattatat accacatcaa tcttctttac 780
 ctcaggacaa cagagggaat agtagagatt ccaaggaaat atctataata gaaaaacaa 840
 atagagaatc tattacaaca aatgttgaag gacgaaggga tatacataaa ggacatcttg 900
 aagaaaagaa agatggttca ataaaaccag aacaaaaaga agataaatct 950

<210> 33

<211> 464

<212> DNA

<213> Plasmodium falciparum

<400> 33

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agtgttcaac aagaacaaca acacaatgtt gaagaaaag ttgaagaaag tgtagaagaa 180
aatgacgaag aaagtgtaga agaaaatgtg gaagaaaatg tagaagaaaa tgacgacgga 240
agtgtagcct caagtgttga agaaagtata gcttcaagtg ttgatgaaag tatagattca 300
agtattgaag aaaatgtagc tccaactgtt gaagaaatcg tagctccaac tgttgaagaa 360
attgtagctc caagtgttgt agaaaagtg gctccaagtg ttgaagaaag tgtagctcca 420
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<212> DNA

<213> Plasmodium falciparum

<400> 34

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aaaaagatga aatcataaaa tctaacttga gaagtgggtc ttcaaattct aggaatcgaa 180
taaagtgagga aaatcacgag aagaaacacg ttttatctca taattcatat gagaaaacta 240
aaaataatga aaataataaa tttttcgata aggataaaga gttaacgatg tctaattgtaa 300
aaaatgtgtc acaaacaat ttcaaaagtc ttttaagaaa tcttggtgtt tcagagaata 360
tattccttaa agaaaataaa tttaataagg aagggaatt aattgaacac ataataaatg 420
atgatgacga taaaaaaaaa tatattaaag ggcaagacga aaacagacaa gaagatcttg 480
aagaaaaagc agctaaagaa agtttacagg ggcaacaaag cgattcagaa caagagagac 540
gtgctaaaga aaagttgcaa gaacaacaaa gcgatttaga acaagagaga cttgctaaag 600
aaaagttgca agaacaacaa agcgatttag aacaagagag acgtgctaaa gaaaagttgc 660
aagaacaaca aagcgattta gaacaagaga gacttgctaa agaaaagttg caagaacaac 720
aaagcgattt agaacaagag agacgtgcta aagaaaagtt gcaagaacaa caaagcgatt 780
tagaacaaga gagacgtgct aaagaaaagt tgcaagaaca acaaagcgat ttagaacaag 840
agagacttgc taaagaaaag ttacaagagc agcaaagcga tttagaacaa gatagacttg 900
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<210> 35

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<212> DNA

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<400> 35

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<213> Plasmodium falciparum

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1 5 10 15	
ttg ata ttt cat ata aat gga aag ata ata aag aat tct gaa aaa gat	96
Leu Ile Phe His Ile Asn Gly Lys Ile Ile Lys Asn Ser Glu Lys Asp	
20 25 30	
gaa atc ata aaa tct aac ttg aga agt ggt tct tca aat tct agg aat	144
Glu Ile Ile Lys Ser Asn Leu Arg Ser Gly Ser Ser Asn Ser Arg Asn	
35 40 45	
cga ata aat gag gaa aat cac gag aag aaa cac gtt tta tct cat aat	192
Arg Ile Asn Glu Glu Asn His Glu Lys Lys His Val Leu Ser His Asn	
50 55 60	
tca tat gag aaa act aaa aat aat gaa aat aat aaa ttt ttc gat aag	240
Ser Tyr Glu Lys Thr Lys Asn Asn Glu Asn Asn Lys Phe Phe Asp Lys	
65 70 75 80	
gat aaa gag tta acg atg tct aat gta aaa aat gtg tca caa aca aat	288
Asp Lys Glu Leu Thr Met Ser Asn Val Lys Asn Val Ser Gln Thr Asn	
85 90 95	
ttc aaa agt ctt tta aga aat ctt ggt gtt tca gag aat ata ttc ctt	336
Phe Lys Ser Leu Leu Arg Asn Leu Gly Val Ser Glu Asn Ile Phe Leu	
100 105 110	
aaa gaa aat aaa tta aat aag gaa ggg aaa tta att gaa cac ata ata	384
Lys Glu Asn Lys Leu Asn Lys Glu Gly Lys Leu Ile Glu His Ile Ile	
115 120 125	
aat gat gat gac gat aaa aaa aaa tat att aaa ggg caa gac gaa aac	432
Asn Asp Asp Asp Asp Lys Lys Lys Tyr Ile Lys Gly Gln Asp Glu Asn	
130 135 140	
aga caa gaa gat ctt gaa gaa aaa gca gct aaa gaa aag tta cag ggg	480
Arg Gln Glu Asp Leu Glu Glu Lys Ala Ala Lys Glu Lys Leu Gln Gly	
145 150 155 160	
caa caa agc gat tca gaa caa gag aga cgt gct aaa gaa aag ttg caa	528
Gln Gln Ser Asp Ser Glu Gln Glu Arg Arg Ala Lys Glu Lys Leu Gln	
165 170 175	
gaa caa caa agc gat tta gaa caa gag aga ctt gct aaa gaa aag ttg	576
Glu Gln Gln Ser Asp Leu Glu Gln Glu Arg Leu Ala Lys Glu Lys Leu	
180 185 190	
caa gaa caa caa agc gat tta gaa caa gag aga cgt gct aaa gaa aag	624
Gln Glu Gln Gln Ser Asp Leu Glu Gln Glu Arg Arg Ala Lys Glu Lys	
195 200 205	

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ttg caa gaa caa caa agc gat tta gaa caa gag aga ctt gct aaa gaa 672
Leu Gln Glu Gln Gln Ser Asp Leu Glu Gln Glu Arg Leu Ala Lys Glu
    210                215                220

aag ttg caa gaa caa caa agc gat tta gaa caa gag aga cgt gct aaa 720
Lys Leu Gln Glu Gln Gln Ser Asp Leu Glu Gln Glu Arg Arg Ala Lys
225                230                235                240

gaa aag ttg caa gaa caa caa agc gat tta gaa caa gag aga cgt gct 768
Glu Lys Leu Gln Glu Gln Gln Ser Asp Leu Glu Gln Glu Arg Arg Ala
    245                250                255

aaa gaa aag ttg caa gaa caa caa agc gat tta gaa caa gag aga ctt 816
Lys Glu Lys Leu Gln Glu Gln Gln Ser Asp Leu Glu Gln Glu Arg Leu
    260                265                270

gct aaa gaa aag tta caa gag cag caa agc gat tta gaa caa gat aga 864
Ala Lys Glu Lys Leu Gln Glu Gln Gln Ser Asp Leu Glu Gln Asp Arg
    275                280                285

ctt gct aaa gaa aag ttg caa gaa caa caa agc gat tta gaa caa gag 912
Leu Ala Lys Glu Lys Leu Gln Glu Gln Gln Ser Asp Leu Glu Gln Glu
    290                295                300

aga cgt gct aaa gaa agg ttg caa gaa caa caa agc gat tta 954
Arg Arg Ala Lys Glu Arg Leu Gln Glu Gln Gln Ser Asp Leu
305                310                315

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<210> 38
<211> 318
<212> PRT
<213> Plasmodium falciparum

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<400> 38
Met Lys His Ile Leu Tyr Ile Ser Phe Tyr Phe Ile Leu Val Asn Leu
 1             5             10             15

Leu Ile Phe His Ile Asn Gly Lys Ile Ile Lys Asn Ser Glu Lys Asp
    20             25             30

Glu Ile Ile Lys Ser Asn Leu Arg Ser Gly Ser Ser Asn Ser Arg Asn
    35             40             45

Arg Ile Asn Glu Glu Asn His Glu Lys Lys His Val Leu Ser His Asn
    50             55             60

Ser Tyr Glu Lys Thr Lys Asn Asn Glu Asn Asn Lys Phe Phe Asp Lys
    65             70             75             80

Asp Lys Glu Leu Thr Met Ser Asn Val Lys Asn Val Ser Gln Thr Asn
    85             90             95

Phe Lys Ser Leu Leu Arg Asn Leu Gly Val Ser Glu Asn Ile Phe Leu
    100            105            110

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Lys Glu Asn Lys Leu Asn Lys Glu Gly Lys Leu Ile Glu His Ile Ile
 115 120 125
 Asn Asp Asp Asp Asp Lys Lys Lys Tyr Ile Lys Gly Gln Asp Glu Asn
 130 135 140
 Arg Gln Glu Asp Leu Glu Glu Lys Ala Ala Lys Glu Lys Leu Gln Gly
 145 150 155 160
 Gln Gln Ser Asp Ser Glu Gln Glu Arg Arg Ala Lys Glu Lys Leu Gln
 165 170 175
 Glu Gln Gln Ser Asp Leu Glu Gln Glu Arg Leu Ala Lys Glu Lys Leu
 180 185 190
 Gln Glu Gln Gln Ser Asp Leu Glu Gln Glu Arg Arg Ala Lys Glu Lys
 195 200 205
 Leu Gln Glu Gln Gln Ser Asp Leu Glu Gln Glu Arg Leu Ala Lys Glu
 210 215 220
 Lys Leu Gln Glu Gln Gln Ser Asp Leu Glu Gln Glu Arg Arg Ala Lys
 225 230 235 240
 Glu Lys Leu Gln Glu Gln Gln Ser Asp Leu Glu Gln Glu Arg Arg Ala
 245 250 255
 Lys Glu Lys Leu Gln Glu Gln Gln Ser Asp Leu Glu Gln Glu Arg Leu
 260 265 270
 Ala Lys Glu Lys Leu Gln Glu Gln Gln Ser Asp Leu Glu Gln Asp Arg
 275 280 285
 Leu Ala Lys Glu Lys Leu Gln Glu Gln Gln Ser Asp Leu Glu Gln Glu
 290 295 300
 Arg Arg Ala Lys Glu Arg Leu Gln Glu Gln Gln Ser Asp Leu
 305 310 315

<210> 39

<211> 1493

<212> DNA

<213> Plasmodium falciparum

<400> 39

caagaacaac aaagcgatct agaacaagag agacgtgcta aagaaaagtt gcaagaacaa 60
 caaagcgatt tagaacaaga tagacttgct aaagaaaagt tacaagagca gcaaagcgat 120
 ttagaacaag agagacttgc taagaaaagt tgcaagaaca acaaagcgat ctagaacaag 180
 agagacgtgc taaagaaaag ttgcaagaac aacaaagcga tttagaacaa gagagacgtg 240
 ctaaagaaaa gttgcaagaa caacaaagcg atttagaaca agatagactt gctaaagaaa 300
 agttacaaga gcagcaaagc gatttagaac aagagagacg tgctaaagaa aagttgcaag 360
 aacaacaaag cgatttagaa caagagagac gtgctaagaa aagttgcaag aacaacaaag 420
 cgatttagaa caagagagac ttgctaaaga aaagttgcaa gaacaacaaa gcgatttaga 480
 acaagagaga cgtgctaaag aaaagttgca agaacaacaa agcgatttag aacaagagag 540
 acgtgctaag aaaagttgca agaacaacaa agcgatttag aacaagagag acgtgctaaa 600
 gaaaagttgc aagagcagca aagagattta gaacaaagga aggctgatac gaaaaaaaaat 660
 ttagaaagaa aaaaggaaca tggagatata ttagcagagg atttatatgg tcgttttagaa 720

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ataccagcta tagaacttcc atcagaaaat gaacgtggat attatatacc acatcaatct 780
tctttacctc aggacaacag agggaaatagt agagattcca aggaaatatc tataatagaa 840
aaaacaaata gagaatctat tacaacaaat gttgaaggac gaagggatat acataaagga 900
catcttgaag aaaagaaaga tggttcaata aaaccagaac aaaaagaaga taaatctgct 960
gacatacaaa atcatacatt agagacagta aatatttctg atgttaatga ttttcaaata 1020
agtaagtatg aggatgaaat aagtgtgtaa tatgacgatt cattaataga tgaagaagaa 1080
gatgatgaag acttagacga atttaagcct attgtgcaat atgacaattt ccaagatgaa 1140
gaaaacatag gaatttataa agaactagaa gatttgatag agaaaaatga aaatttagat 1200
gatttagatg aaggaataga aaaatcatca gaagaattat ctgaagaaaa aataaaaaaa 1260
ggaaagaaat atgaaaaaac aaaggataat aatttttaaac caaatgataa aagtttgtat 1320
gatgagcata ttaaaaaata taaaaatgat aagcaggtta ataaggaaaa ggaaaaattc 1380
ataaaatcat tgtttcatat atttgacgga gacaatgaaa ttttacagat cgtggatgag 1440
ttatctgaag atataactaa atattttatg aaactataaa aggttatata ttt 1493

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<210> 40

<211> 12

<212> DNA

<213> Plasmodium falciparum

<400> 40

caagaacaac aa

12

<210> 41

<211> 12

<212> DNA

<213> Plasmodium falciparum

<400> 41

ggttatatat tt

12

<210> 42

<211> 1494

<212> DNA

<213> Plasmodium falciparum

<220>

<221> CDS

<222> (1)..(1494)

<400> 42

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caa gaa caa caa agc gat cta gaa caa gag aga cgt gct aaa gaa aag 48
Gln Glu Gln Gln Ser Asp Leu Glu Gln Glu Arg Arg Ala Lys Glu Lys
1 5 10 15

```

```

ttg caa gaa caa caa agc gat tta gaa caa gat aga ctt gct aaa gaa 96
Leu Gln Glu Gln Gln Ser Asp Leu Glu Gln Asp Arg Leu Ala Lys Glu
20 25 30

```

```

aag tta caa gag cag caa agc gat tta gaa caa gag aga ctt gct aaa 144
Lys Leu Gln Glu Gln Gln Ser Asp Leu Glu Gln Glu Arg Leu Ala Lys
35 40 45

```

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gaa aag ttg caa gaa caa caa agc gat cta gaa caa gag aga cgt gct 192
Glu Lys Leu Gln Glu Gln Gln Ser Asp Leu Glu Gln Glu Arg Arg Ala
50 55 60

```

aaa gaa aag ttg caa gaa caa caa agc gat tta gaa caa gag aga cgt	240
Lys Glu Lys Leu Gln Glu Gln Gln Ser Asp Leu Glu Gln Glu Arg Arg	
65 70 75 80	
gct aaa gaa aag ttg caa gaa caa caa agc gat tta gaa caa gat aga	288
Ala Lys Glu Lys Leu Gln Glu Gln Gln Ser Asp Leu Glu Gln Asp Arg	
85 90 95	
ctt gct aaa gaa aag tta caa gag cag caa agc gat tta gaa caa gag	336
Leu Ala Lys Glu Lys Leu Gln Glu Gln Gln Ser Asp Leu Glu Gln Glu	
100 105 110	
aga cgt gct aaa gaa aag ttg caa gaa caa caa agc gat tta gaa caa	384
Arg Arg Ala Lys Glu Lys Leu Gln Glu Gln Gln Ser Asp Leu Glu Gln	
115 120 125	
gag aga cgt gct aaa gaa aag ttg caa gaa caa caa agc gat tta gaa	432
Glu Arg Arg Ala Lys Glu Lys Leu Gln Glu Gln Gln Ser Asp Leu Glu	
130 135 140	
caa gag aga ctt gct aaa gaa aag ttg caa gaa caa caa agc gat tta	480
Gln Glu Arg Leu Ala Lys Glu Lys Leu Gln Glu Gln Gln Ser Asp Leu	
145 150 155 160	
gaa caa gag aga cgt gct aaa gaa aag ttg caa gaa caa caa agc gat	528
Glu Gln Glu Arg Arg Ala Lys Glu Lys Leu Gln Glu Gln Gln Ser Asp	
165 170 175	
tta gaa caa gag aga cgt gct aaa gaa aag ttg caa gaa caa caa agc	576
Leu Glu Gln Glu Arg Arg Ala Lys Glu Lys Leu Gln Glu Gln Gln Ser	
180 185 190	
gat tta gaa caa gag aga cgt gct aaa gaa aag ttg caa gag cag caa	624
Asp Leu Glu Gln Glu Arg Arg Ala Lys Glu Lys Leu Gln Glu Gln Gln	
195 200 205	
aga gat tta gaa caa agg aag gct gat acg aaa aaa aat tta gaa aga	672
Arg Asp Leu Glu Gln Arg Lys Ala Asp Thr Lys Lys Asn Leu Glu Arg	
210 215 220	
aaa aag gaa cat gga gat ata tta gca gag gat tta tat ggt cgt tta	720
Lys Lys Glu His Gly Asp Ile Leu Ala Glu Asp Leu Tyr Gly Arg Leu	
225 230 235 240	
gaa ata cca gct ata gaa ctt cca tca gaa aat gaa cgt gga tat tat	768
Glu Ile Pro Ala Ile Glu Leu Pro Ser Glu Asn Glu Arg Gly Tyr Tyr	
245 250 255	
ata cca cat caa tct tct tta cct cag gac aac aga ggg aat agt aga	816
Ile Pro His Gln Ser Ser Leu Pro Gln Asp Asn Arg Gly Asn Ser Arg	
260 265 270	
gat tcc aag gaa ata tct ata ata gaa aaa aca aat aga gaa tct att	864
Asp Ser Lys Glu Ile Ser Ile Ile Glu Lys Thr Asn Arg Glu Ser Ile	
275 280 285	

aca aca aat gtt gaa gga cga agg gat ata cat aaa gga cat ctt gaa	912
Thr Thr Asn Val Glu Gly Arg Arg Asp Ile His Lys Gly His Leu Glu	
290 295 300	
gaa aag aaa gat ggt tca ata aaa cca gaa caa aaa gaa gat aaa tct	960
Glu Lys Lys Asp Gly Ser Ile Lys Pro Glu Gln Lys Glu Asp Lys Ser	
305 310 315 320	
gct gac ata caa aat cat aca tta gag aca gta aat att tct gat gtt	1008
Ala Asp Ile Gln Asn His Thr Leu Glu Thr Val Asn Ile Ser Asp Val	
325 330 335	
aat gat ttt caa ata agt aag tat gag gat gaa ata agt gct gaa tat	1056
Asn Asp Phe Gln Ile Ser Lys Tyr Glu Asp Glu Ile Ser Ala Glu Tyr	
340 345 350	
gac gat tca tta ata gat gaa gaa gaa gat gat gaa gac tta gac gaa	1104
Asp Asp Ser Leu Ile Asp Glu Glu Glu Asp Asp Glu Asp Leu Asp Glu	
355 360 365	
ttt aag cct att gtg caa tat gac aat ttc caa gat gaa gaa aac ata	1152
Phe Lys Pro Ile Val Gln Tyr Asp Asn Phe Gln Asp Glu Glu Asn Ile	
370 375 380	
gga att tat aaa gaa cta gaa gat ttg ata gag aaa aat gaa aat tta	1200
Gly Ile Tyr Lys Glu Leu Glu Asp Leu Ile Glu Lys Asn Glu Asn Leu	
385 390 395 400	
gat gat tta gat gaa gga ata gaa aaa tca tca gaa gaa tta tct gaa	1248
Asp Asp Leu Asp Glu Gly Ile Glu Lys Ser Ser Glu Glu Leu Ser Glu	
405 410 415	
gaa aaa ata aaa aaa gga aag aaa tat gaa aaa aca aag gat aat aat	1296
Glu Lys Ile Lys Lys Gly Lys Lys Tyr Glu Lys Thr Lys Asp Asn Asn	
420 425 430	
ttt aaa cca aat gat aaa agt ttg tat gat gag cat att aaa aaa tat	1344
Phe Lys Pro Asn Asp Lys Ser Leu Tyr Asp Glu His Ile Lys Lys Tyr	
435 440 445	
aaa aat gat aag cag gtt aat aag gaa aag gaa aaa ttc ata aaa tca	1392
Lys Asn Asp Lys Gln Val Asn Lys Glu Lys Glu Lys Phe Ile Lys Ser	
450 455 460	
ttg ttt cat ata ttt gac gga gac aat gaa att tta cag atc gtg gat	1440
Leu Phe His Ile Phe Asp Gly Asp Asn Glu Ile Leu Gln Ile Val Asp	
465 470 475 480	
gag tta tct gaa gat ata act aaa tat ttt atg aaa cta taa aag gtt	1488
Glu Leu Ser Glu Asp Ile Thr Lys Tyr Phe Met Lys Leu	
485 490	
ata tat	1494

<210> 43

<211> 493

<212> PRT

<213> Plasmodium falciparum

<400> 43

Gln	Glu	Gln	Gln	Ser	Asp	Leu	Glu	Gln	Glu	Arg	Arg	Ala	Lys	Glu	Lys	1	5	10	15
Leu	Gln	Glu	Gln	Ser	Asp	Leu	Glu	Gln	Asp	Arg	Leu	Ala	Lys	Glu		20	25	30	
Lys	Leu	Gln	Glu	Gln	Gln	Ser	Asp	Leu	Glu	Gln	Glu	Arg	Leu	Ala	Lys	35	40	45	
Glu	Lys	Leu	Gln	Glu	Gln	Gln	Ser	Asp	Leu	Glu	Gln	Glu	Arg	Arg	Ala	50	55	60	
Lys	Glu	Lys	Leu	Gln	Glu	Gln	Gln	Ser	Asp	Leu	Glu	Gln	Glu	Arg	Arg	65	70	75	80
Ala	Lys	Glu	Lys	Leu	Gln	Glu	Gln	Gln	Ser	Asp	Leu	Glu	Gln	Asp	Arg	85	90	95	
Leu	Ala	Lys	Glu	Lys	Leu	Gln	Glu	Gln	Gln	Ser	Asp	Leu	Glu	Gln	Glu	100	105	110	
Arg	Arg	Ala	Lys	Glu	Lys	Leu	Gln	Glu	Gln	Gln	Ser	Asp	Leu	Glu	Gln	115	120	125	
Glu	Arg	Arg	Ala	Lys	Glu	Lys	Leu	Gln	Glu	Gln	Gln	Ser	Asp	Leu	Glu	130	135	140	
Gln	Glu	Arg	Leu	Ala	Lys	Glu	Lys	Leu	Gln	Glu	Gln	Gln	Ser	Asp	Leu	145	150	155	160
Glu	Gln	Glu	Arg	Arg	Ala	Lys	Glu	Lys	Leu	Gln	Glu	Gln	Gln	Ser	Asp	165	170	175	
Leu	Glu	Gln	Glu	Arg	Arg	Ala	Lys	Glu	Lys	Leu	Gln	Glu	Gln	Gln	Ser	180	185	190	
Asp	Leu	Glu	Gln	Glu	Arg	Arg	Ala	Lys	Glu	Lys	Leu	Gln	Glu	Gln	Gln	195	200	205	
Arg	Asp	Leu	Glu	Gln	Arg	Lys	Ala	Asp	Thr	Lys	Lys	Asn	Leu	Glu	Arg	210	215	220	
Lys	Lys	Glu	His	Gly	Asp	Ile	Leu	Ala	Glu	Asp	Leu	Tyr	Gly	Arg	Leu	225	230	235	240
Glu	Ile	Pro	Ala	Ile	Glu	Leu	Pro	Ser	Glu	Asn	Glu	Arg	Gly	Tyr	Tyr	245	250	255	
Ile	Pro	His	Gln	Ser	Ser	Leu	Pro	Gln	Asp	Asn	Arg	Gly	Asn	Ser	Arg	260	265	270	

Asp Ser Lys Glu Ile Ser Ile Ile Glu Lys Thr Asn Arg Glu Ser Ile
 275 280 285
 Thr Thr Asn Val Glu Gly Arg Arg Asp Ile His Lys Gly His Leu Glu
 290 295 300
 Glu Lys Lys Asp Gly Ser Ile Lys Pro Glu Gln Lys Glu Asp Lys Ser
 305 310 315 320
 Ala Asp Ile Gln Asn His Thr Leu Glu Thr Val Asn Ile Ser Asp Val
 325 330 335
 Asn Asp Phe Gln Ile Ser Lys Tyr Glu Asp Glu Ile Ser Ala Glu Tyr
 340 345 350
 Asp Asp Ser Leu Ile Asp Glu Glu Glu Asp Asp Glu Asp Leu Asp Glu
 355 360 365
 Phe Lys Pro Ile Val Gln Tyr Asp Asn Phe Gln Asp Glu Glu Asn Ile
 370 375 380
 Gly Ile Tyr Lys Glu Leu Glu Asp Leu Ile Glu Lys Asn Glu Asn Leu
 385 390 395 400
 Asp Asp Leu Asp Glu Gly Ile Glu Lys Ser Ser Glu Glu Leu Ser Glu
 405 410 415
 Glu Lys Ile Lys Lys Gly Lys Lys Tyr Glu Lys Thr Lys Asp Asn Asn
 420 425 430
 Phe Lys Pro Asn Asp Lys Ser Leu Tyr Asp Glu His Ile Lys Lys Tyr
 435 440 445
 Lys Asn Asp Lys Gln Val Asn Lys Glu Lys Glu Lys Phe Ile Lys Ser
 450 455 460
 Leu Phe His Ile Phe Asp Gly Asp Asn Glu Ile Leu Gln Ile Val Asp
 465 470 475 480
 Glu Leu Ser Glu Asp Ile Thr Lys Tyr Phe Met Lys Leu
 485 490

<210> 44
 <211> 12
 <212> DNA
 <213> Plasmodium falciparum

<400> 44
 caagaacaac aa

12

<210> 45
 <211> 12
 <212> DNA
 <213> Plasmodium falciparum

<400> 45
 atgaaactat aa

12

<210> 46
 <211> 1494
 <212> DNA
 <213> Plasmodium falciparum

<220>
 <221> CDS
 <222> (1)..(1494)

<400> 46
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 1 5 10 15
 ttg caa gaa caa caa agc gat tta gaa caa gat aga ctt gct aaa gaa 96
 Leu Gln Glu Gln Gln Ser Asp Leu Glu Gln Asp Arg Leu Ala Lys Glu
 20 25 30
 aag tta caa gag cag caa agc gat tta gaa caa gag aga ctt gct aaa 144
 Lys Leu Gln Glu Gln Gln Ser Asp Leu Glu Gln Glu Arg Leu Ala Lys
 35 40 45
 gaa aag ttg caa gaa caa caa agc gat cta gaa caa gag aga cgt gct 192
 Glu Lys Leu Gln Glu Gln Gln Ser Asp Leu Glu Gln Glu Arg Arg Ala
 50 55 60
 aaa gaa aag ttg caa gaa caa caa agc gat tta gaa caa gag aga cgt 240
 Lys Glu Lys Leu Gln Glu Gln Gln Ser Asp Leu Glu Gln Glu Arg Arg
 65 70 75 80
 gct aaa gaa aag ttg caa gaa caa caa agc gat tta gaa caa gat aga 288
 Ala Lys Glu Lys Leu Gln Glu Gln Gln Ser Asp Leu Glu Gln Asp Arg
 85 90 95
 ctt gct aaa gaa aag tta caa gag cag caa agc gat tta gaa caa gag 336
 Leu Ala Lys Glu Lys Leu Gln Glu Gln Gln Ser Asp Leu Glu Gln Glu
 100 105 110
 aga cgt gct aaa gaa aag ttg caa gaa caa caa agc gat tta gaa caa 384
 Arg Arg Ala Lys Glu Lys Leu Gln Glu Gln Gln Ser Asp Leu Glu Gln
 115 120 125
 gag aga cgt gct aaa gaa aag ttg caa gaa caa caa agc gat tta gaa 432
 Glu Arg Arg Ala Lys Glu Lys Leu Gln Glu Gln Gln Ser Asp Leu Glu
 130 135 140
 caa gag aga ctt gct aaa gaa aag ttg caa gaa caa caa agc gat tta 480
 Gln Glu Arg Leu Ala Lys Glu Lys Leu Gln Glu Gln Gln Ser Asp Leu
 145 150 155 160
 gaa caa gag aga cgt gct aaa gaa aag ttg caa gaa caa caa agc gat 528
 Glu Gln Glu Arg Arg Ala Lys Glu Lys Leu Gln Glu Gln Gln Ser Asp
 165 170 175
 tta gaa caa gag aga cgt gct aaa gaa aag ttg caa gaa caa caa agc 576
 Leu Glu Gln Glu Arg Arg Ala Lys Glu Lys Leu Gln Glu Gln Gln Ser
 180 185 190

gat tta gaa caa gag aga cgt gct aaa gaa aag ttg caa gag cag caa	624
Asp Leu Glu Gln Glu Arg Arg Ala Lys Glu Lys Leu Gln Glu Gln Gln	
195 200 205	
aga gat tta gaa caa agg aag gct gat acg aaa aaa aat tta gaa aga	672
Arg Asp Leu Glu Gln Arg Lys Ala Asp Thr Lys Lys Asn Leu Glu Arg	
210 215 220	
aaa aag gaa cat gga gat ata tta gca gag gat tta tat ggt cgt tta	720
Lys Lys Glu His Gly Asp Ile Leu Ala Glu Asp Leu Tyr Gly Arg Leu	
225 230 235 240	
gaa ata cca gct ata gaa ctt cca tca gaa aat gaa cgt gga tat tat	768
Glu Ile Pro Ala Ile Glu Leu Pro Ser Glu Asn Glu Arg Gly Tyr Tyr	
245 250 255	
ata cca cat caa tct tct tta cct cag gac aac aga ggg aat agt aga	816
Ile Pro His Gln Ser Ser Leu Pro Gln Asp Asn Arg Gly Asn Ser Arg	
260 265 270	
gat tcc aag gaa ata tct ata ata gaa aaa aca aat aga gaa tct att	864
Asp Ser Lys Glu Ile Ser Ile Ile Glu Lys Thr Asn Arg Glu Ser Ile	
275 280 285	
aca aca aat gtt gaa gga cga agg gat ata cat aaa gga cat ctt gaa	912
Thr Thr Asn Val Glu Gly Arg Arg Asp Ile His Lys Gly His Leu Glu	
290 295 300	
gaa aag aaa gat ggt tca ata aaa cca gaa caa aaa gaa gat aaa tct	960
Glu Lys Lys Asp Gly Ser Ile Lys Pro Glu Gln Lys Glu Asp Lys Ser	
305 310 315 320	
gct gac ata caa aat cat aca tta gag aca gta aat att tct gat gtt	1008
Ala Asp Ile Gln Asn His Thr Leu Glu Thr Val Asn Ile Ser Asp Val	
325 330 335	
aat gat ttt caa ata agt aag tat gag gat gaa ata agt gct gaa tat	1056
Asn Asp Phe Gln Ile Ser Lys Tyr Glu Asp Glu Ile Ser Ala Glu Tyr	
340 345 350	
gac gat tca tta ata gat gaa gaa gaa gat gat gaa gac tta gac gaa	1104
Asp Asp Ser Leu Ile Asp Glu Glu Glu Asp Asp Glu Asp Leu Asp Glu	
355 360 365	
ttt aag cct att gtg caa tat gac aat ttc caa gat gaa gaa aac ata	1152
Phe Lys Pro Ile Val Gln Tyr Asp Asn Phe Gln Asp Glu Glu Asn Ile	
370 375 380	
gga att tat aaa gaa cta gaa gat ttg ata gag aaa aat gaa aat tta	1200
Gly Ile Tyr Lys Glu Leu Glu Asp Leu Ile Glu Lys Asn Glu Asn Leu	
385 390 395 400	
gat gat tta gat gaa gga ata gaa aaa tca tca gaa gaa tta tct gaa	1248
Asp Asp Leu Asp Glu Gly Ile Glu Lys Ser Ser Glu Glu Leu Ser Glu	
405 410 415	

gaa aaa ata aaa aaa gga aag aaa tat gaa aaa aca aag gat aat aat 1296
 Glu Lys Ile Lys Lys Gly Lys Lys Tyr Glu Lys Thr Lys Asp Asn Asn
 420 425 430

 ttt aaa cca aat gat aaa agt ttg tat gat gag cat att aaa aaa tat 1344
 Phe Lys Pro Asn Asp Lys Ser Leu Tyr Asp Glu His Ile Lys Lys Tyr
 435 440 445

 aaa aat gat aag cag gtt aat aag gaa aag gaa aaa ttc ata aaa tca 1392
 Lys Asn Asp Lys Gln Val Asn Lys Glu Lys Glu Lys Phe Ile Lys Ser
 450 455 460

 ttg ttt cat ata ttt gac gga gac aat gaa att tta cag atc gtg gat 1440
 Leu Phe His Ile Phe Asp Gly Asp Asn Glu Ile Leu Gln Ile Val Asp
 465 470 475 480

 gag tta tct gaa gat ata act aaa tat ttt atg aaa cta taa aag gtt 1488
 Glu Leu Ser Glu Asp Ile Thr Lys Tyr Phe Met Lys Leu
 485 490

 ata tat 1494

<210> 47
 <211> 493
 <212> PRT
 <213> Plasmodium falciparum

<400> 47
 Gln Glu Gln Gln Ser Asp Leu Glu Gln Glu Arg Arg Ala Lys Glu Lys
 1 5 10 15

 Leu Gln Glu Gln Gln Ser Asp Leu Glu Gln Asp Arg Leu Ala Lys Glu
 20 25 30

 Lys Leu Gln Glu Gln Gln Ser Asp Leu Glu Gln Glu Arg Leu Ala Lys
 35 40 45

 Glu Lys Leu Gln Glu Gln Gln Ser Asp Leu Glu Gln Glu Arg Arg Ala
 50 55 60

 Lys Glu Lys Leu Gln Glu Gln Gln Ser Asp Leu Glu Gln Glu Arg Arg
 65 70 75 80

 Ala Lys Glu Lys Leu Gln Glu Gln Gln Ser Asp Leu Glu Gln Asp Arg
 85 90 95

 Leu Ala Lys Glu Lys Leu Gln Glu Gln Gln Ser Asp Leu Glu Gln Glu
 100 105 110

 Arg Arg Ala Lys Glu Lys Leu Gln Glu Gln Gln Ser Asp Leu Glu Gln
 115 120 125

 Glu Arg Arg Ala Lys Glu Lys Leu Gln Glu Gln Gln Ser Asp Leu Glu
 130 135 140

 Gln Glu Arg Leu Ala Lys Glu Lys Leu Gln Glu Gln Gln Ser Asp Leu
 145 150 155 160

Glu Gln Glu Arg Arg Ala Lys Glu Lys Leu Gln Glu Gln Gln Ser Asp
 165 170 175
 Leu Glu Gln Glu Arg Arg Ala Lys Glu Lys Leu Gln Glu Gln Gln Ser
 180 185 190
 Asp Leu Glu Gln Glu Arg Arg Ala Lys Glu Lys Leu Gln Glu Gln Gln
 195 200 205
 Arg Asp Leu Glu Gln Arg Lys Ala Asp Thr Lys Lys Asn Leu Glu Arg
 210 215 220
 Lys Lys Glu His Gly Asp Ile Leu Ala Glu Asp Leu Tyr Gly Arg Leu
 225 230 235 240
 Glu Ile Pro Ala Ile Glu Leu Pro Ser Glu Asn Glu Arg Gly Tyr Tyr
 245 250 255
 Ile Pro His Gln Ser Ser Leu Pro Gln Asp Asn Arg Gly Asn Ser Arg
 260 265 270
 Asp Ser Lys Glu Ile Ser Ile Ile Glu Lys Thr Asn Arg Glu Ser Ile
 275 280 285
 Thr Thr Asn Val Glu Gly Arg Arg Asp Ile His Lys Gly His Leu Glu
 290 295 300
 Glu Lys Lys Asp Gly Ser Ile Lys Pro Glu Gln Lys Glu Asp Lys Ser
 305 310 315 320
 Ala Asp Ile Gln Asn His Thr Leu Glu Thr Val Asn Ile Ser Asp Val
 325 330 335
 Asn Asp Phe Gln Ile Ser Lys Tyr Glu Asp Glu Ile Ser Ala Glu Tyr
 340 345 350
 Asp Asp Ser Leu Ile Asp Glu Glu Glu Asp Asp Glu Asp Leu Asp Glu
 355 360 365
 Phe Lys Pro Ile Val Gln Tyr Asp Asn Phe Gln Asp Glu Glu Asn Ile
 370 375 380
 Gly Ile Tyr Lys Glu Leu Glu Asp Leu Ile Glu Lys Asn Glu Asn Leu
 385 390 395 400
 Asp Asp Leu Asp Glu Gly Ile Glu Lys Ser Ser Glu Glu Leu Ser Glu
 405 410 415
 Glu Lys Ile Lys Lys Gly Lys Lys Tyr Glu Lys Thr Lys Asp Asn Asn
 420 425 430
 Phe Lys Pro Asn Asp Lys Ser Leu Tyr Asp Glu His Ile Lys Lys Tyr
 435 440 445
 Lys Asn Asp Lys Gln Val Asn Lys Glu Lys Glu Lys Phe Ile Lys Ser
 450 455 460

Leu	Phe	His	Ile	Phe	Asp	Gly	Asp	Asn	Glu	Ile	Leu	Gln	Ile	Val	Asp
465					470					475					480
Glu	Leu	Ser	Glu	Asp	Ile	Thr	Lys	Tyr	Phe	Met	Lys	Leu			
				485					490						